

In a list of Egyptian (Naukratite) porcelain charms and ornaments on p. 137, Mr. Myres mentions "4726-4732. Hawk-headed deity with disc on head. . . . 4736-4737. Hippopotamus-headed deity. . . . 4746. Ram-headed deity." We are not informed whether 4746 is Amen or Khnemu, and the names of 4726-4732 (apparently Rā) and 4736-4737 (Taurt) might well have been given. And what is the inscription on the Babylonian cylinder, No. 4501, which, by the way, is not necessarily of early date, about? The "hieroglyphic inscriptions" on the scarabs (Nos. 4541, 4547-4549; p. 135) are ignored.

Turning to a comparatively unimportant detail, we note a frequent occurrence of the hideous Germanism, "snow-man technique." Cannot some better term than this be devised for the style of what are merely rude hand-made figures?

The labour of correcting misprints in such a work must have been colossal; but the result is extremely good. We only notice Ra-men-kepher for Ra-men-kheper on p. 135. To Mr. H. B. Walters, who read the proofs through, much praise is due. He is also responsible for the annexed reports on excavations at Kurion, Salamis and Maroni, from which a good idea of the marvellous mixture which the average Cyprian tomb contains may be obtained. We are still far from being able to dogmatise with regard to Cyprian archaeology!

The indices also deserve praise, but the mistaken aim of making the book serve as a traveller's guide has, by restricting its size, sadly curtailed the number and size of the plates.

Generally speaking, the book will be to the "wayfaring man" (p. viii.) of little use, but to the archaeologist it will no doubt prove valuable. Although, we expect, that if he already knows the collection, he will often find it difficult to recognise the objects from Mr. Myres' and "O-R"'s somewhat meagre descriptions of them, yet the care with which the known *provenance* of all objects is noted, and vague statements on the subject are sifted and verified by the authors, will be of great assistance to him. He will know how far Mr. Myres' archaeological theories will be of service to him. If archaeology is to be constructive, if it seeks to explain its discoveries, it must formulate hypotheses. These hypotheses are often suggestive, often really explain things in a manner which, as far as we can know, is perfectly satisfactory; but as often they are mere *ballons d'essai*, improbable and unsatisfactory. Hypotheses of both kinds occur in the introduction to the *Cyprus Museum Catalogue*: the archaeologist will be able to distinguish between them, but the "wayfaring man" has no means of separating the wheat from the chaff. On him, therefore, it cannot be too strongly impressed that the whole story of the development of human civilisation in Cyprus and the Ægean basin before the 8th century B.C. is still merely a collection of hypotheses, sometimes agreeing, more often disagreeing, with one another, and therefore that any description of "Early Man" in Greece or in Cyprus is not a statement of historical facts, but a simple expression of the individual opinion of its author on the subject.

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TEXT-BOOK ON THE STRENGTH OF MATERIALS.

The Strength of Materials. By Prof. J. A. Ewing, F.R.S. Pp. xii + 246. (Cambridge University Press, 1899.)

ALL teachers and students of applied mechanics will heartily welcome this book. It is based on the author's article, "Strength of Materials," which appears in the ninth edition of the *Encyclopædia Britannica*. As in his book on the "Steam Engine," the present book is characterised by Prof. Ewing's excellent style and clearness of exposition. The subject matter includes those portions of the subject which are usually taught at the higher colleges.

The author wastes no time in plunging into his subject. The first two chapters are devoted to a general analysis between stress and strain, and the relation between the three elastic coefficients in an isotropic body. Probably many teachers would prefer to postpone the consideration of part of these two chapters—particularly the contents of the second—to a later stage of the book, and this can readily be done without interfering with the usefulness of the book as a text-book. Chapter iii. deals with non-elastic strain, a part of the subject on which Prof. Ewing is particularly qualified to speak. A concise account is given of some of the recent experiments of Mr. Muir on the effect of heating in facilitating recovery of elasticity after overstraining, and it is to be hoped that in any future editions the author will give a full account of the very recent experiments by Mr. Rosanhain and himself on the crystalline structure of metals—a subject which, in the present edition, is merely referred to. The fourth chapter will be found exceedingly valuable to the teacher, dealing, as it does, with the testing of materials, and containing photographs of several pieces of self-contained apparatus designed (by the author) to determine the various elastic constants, and which have been proved to be serviceable in the author's laboratory at Cambridge. Chapters v. and vi. deal with uniformly-varying distributions of stress, and the bending and shearing stresses induced in beams. On page 98 will be found some interesting remarks on the variation of stress over different sections of a tie-rod. In dealing with this subject it is interesting to notice that in a uniformly strained piece of any shape whatever having parallel sides, the distribution of stress over any section might be graphically determined by Prof. Hele-Shaw's method of the flow of a viscous fluid between two parallel plates placed very near together, the boundaries having the same shape as the piece considered. The stress at any point will then be inversely as the distance between adjacent stream-lines, the stream-lines being supposed spaced at equal distances apart at a section where the stress is uniformly distributed. The deflection of beams and the question of continuous girders are discussed in Chapter vii., whilst in Chapter ix. will be found a luminous treatment of struts and columns. Chapter x. is devoted to a consideration of the torsion of shafts and of springs, whilst in Chapter xi. the stresses induced in thin and thick cylinders due to internal or external pressure, and in a thin rotating disc are treated in an exceedingly lucid manner. A valuable addition to the contents of these chapters would be an

analysis of the stresses induced in the different parts of high speed connecting rods and crank shafts. Finally, Chapters viii. and xii. are devoted to a very concise discussion of frames, hanging chains and arched ribs.

In the preface, the author states that the book is only intended to be a lecture-room treatment of the subject, which to be effective must be supplemented by laboratory and drawing office work. We venture to think that the work usually done in the drawing office is, in many cases, of such a special and routine character that it only serves to illustrate a very few branches of the subject. It is, of course, true that a properly equipped laboratory, such as the one at Cambridge, enables the student to provide himself with examples which illustrate a very considerable portion of the subject, but some teachers of applied mechanics—fortunately few in number—do not possess a laboratory, and even many of those who do find it desirable to still further supplement the work done in it by means of tutorial classes. The complete absence of any numerical examples will be consequently much felt, and the author would considerably increase the value of his books as *class-room* text-books if he would add, at the end of them, a set of judiciously selected numerical examples which would forcibly illustrate the different points raised in the text.

A word of praise should be given to the Cambridge University Press for the excellent manner in which the book is printed and arranged. It is to be hoped that the present book, together with the same author's "Steam Engine," are intended to form the nucleus of a library of text-books dealing with engineering subjects.

S. D.

A NEW WORK ON LEAD.

Metallurgy of Lead and Silver. Part I. By Henry F. Collins. Pp. xvi + 368. (London: C. Griffin and Co., Ltd., 1899.)

THIS work is one of a series of metallurgical treatises edited by Sir W. C. Roberts-Austen, F.R.S., and written by one of his former pupils, who, besides having gone through a course of training at the Royal College of Science with distinguished success, has had a large amount of practical experience in mines and metallurgical works, which renders him well qualified to successfully undertake the compilation of a work on lead smelting. In these days of great metallurgical enterprises it is of the utmost importance that we should be kept acquainted with the up-to-date methods of our competitors all over the world; and although there are several good books in existence dealing with the metallurgy of lead, the present one is a welcome addition.

The author starts with methods of assaying lead and silver ores, which is a necessary part of the process, and gives valuable information on the method of correct sampling; he also points out those methods of assaying which yield the best results by the wet and dry ways. A very admirable feature of the book is the abundant reference to authority, in which he follows the notable example of his distinguished editor. With the object of economising space, as well as facilitating reference and comparison, details of the practice in particular localities

have been thrown into the form of tabular statements, and these should prove useful for reference.

It is much to be regretted that so many errors have been allowed to remain in the text and referred to in the table of errata, when by a little more care they might have been avoided. The section on alloys of lead is very meagre, and chiefly compiled from the writings of other metallurgists. Such loose statements as "No definite alloys of lead and antimony are known" (p. 24) are entirely misleading, as several varieties of lead-antimony alloys are used for type metal. The properties of lead as used in trade with the various defects experienced in practical work, such as plumbing, would have formed a valuable adjunct, as many persons are interested in lead-working who care little about the smelting of ores.

The chapter on lead ores, although somewhat condensed, contains the chief information required for practical purposes. The greater part of the book is devoted to lead smelting. It is treated in a sufficiently full manner, the information is reliable, and the language explicit. We are sorry to learn that the various forms of mechanical roasters are not more generally applicable, and that the hand-rabbed reverberatories, with the enormous cost of manual labour, are still in extensive use on account of the scarcity of skilled labour in many localities, mechanical furnaces only being adopted in the larger works where the required skill is available. Various kinds of roasting furnaces are carefully described and their merits discussed. The chemical side of the question is admirably dealt with, and greatly adds to the value of the book for scientific readers.

The principles of blast furnace practice here given forms the most prominent and important part of the work, and should be extremely useful to those engaged in the lead-smelting industry. A correct knowledge of the scientific basis of the processes has not been attained in the past by those responsible for some of our works, and possibly this method of treatment may enable some of our closed mines to be reopened and profitably worked. At any rate, we commend the suggestion to those concerned. The author has brought a wide range of knowledge to bear on the subject, and gives useful data for correct blast furnace practice. The nature of fluxes and composition of slags, with their proper chemical formulæ, are here given in considerable detail, and indicate a complete grasp of the subject.

Chapter ix. commences with some recognised methods of analysing ores and slags, so as to enable the operator to properly apportion the constituents of the charge. This is followed by instructions as to the method of calculating the charge, which is somewhat complicated in large works, dealing with a variety of complex ores. Chapter x. deals with blast furnace products, and as these may consist of lead speiss, regulus, slag and secondary products, which have to be separately dealt with, it will be seen how important their consideration to the lead smelter must be. It also contains a considerable number of analyses of mattes, speisses and slags very valuable for purposes of reference.

The subject of flue-dust, its composition, collection and treatment, is discussed in a clear and instructive manner. The difficulties met with in smelting mixed ores of lead and zinc, and the various processes, dry and